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Effect of Accumulated Exercise and Continuous Exercise on Energy Metabolism

Songtao Wang, Dan Li, Xiangyu Shuai

School of Physical Education and Sports Science, South China Normal University

Objective Sedentary behavior is the main feature of modern lifestyle, which relate to most chronic diseases. Therefore, it has great significance in both theory and practice of weight control and health promotion to find some exercise modes which can effectively break sedentary lifestyle and increase daily physical activity. The multiple short-time exercise scattered throughout the whole day was called Accumulated Exercise. Accumulated exercise can break the sedentary lifestyle, but our understanding about the energy metabolism and its influence on appetite is limited. This study measured the energy expenditure of two kind of exercise with equal workload (moderate intensity continuous exercise and accumulated exercise) as well as their impact on appetite, in order to enhance the effect and adherence of exercise intervention in weight control and health promotion.

Methods 16 healthy college students (8 male and 8 female) were recruited. Three experiments were randomly carried out with one week's interval, which were recorded as rest control, accumulated exercise and continuous exercise. Accumulated exercise and continuous exercise were performed on treadmill with 65%VO₂max intensity. Continuous exercise was lasted 1 hour without interval, while accumulated exercise was divided 4 times, 15min each, with 1 hour's interval. The total exercise load (running distance) of the two exercise is equal.

The volume of consumed O₂ and generated CO₂ in pre-exercise, during exercise, and post-exercise (0-4h) were dynamically monitored. The gastric electricity and appetite scale after exercise, as well as the basal metabolic rate of the next morning was also measured. Using the Peronnet and Massiott equations to calculate the carbohydrate oxidation, fat oxidation, and the total energy expenditure during exercise and post-exercise (0-4h), then compare the differences between the two kind of exercise in energy expenditure, appetite, and gastric electrical activity.

Results Compared with continuous exercise with equal workload, accumulated exercise can increase fat oxidation (and %) during exercise and exercise interval, as well as the total energy expenditure in exercise interval, especially in male students. However, accumulated exercise has the potential to promote stomach emptying, and then increase the appetite (before bedtime). While the continuous exercise can significantly suppress the appetite of the next meal.

Conclusions Accumulated exercise and continuous exercise has different advantage in promoting energy (fat) expenditure and suppressing appetite respectively, so they should be jointly applied to enhanced effects of exercise intervention on weight control.